



# SCHS Studies

A Special Report Series by the State Center for Health Statistics  
1908 Mail Service Center, Raleigh, N.C. 27699-1908  
[www.schs.state.nc.us/SCHS/](http://www.schs.state.nc.us/SCHS/)

No. 133

June 2002

## Health Conditions and Behaviors Among North Carolina and United States Military Veterans Compared to Non-Veterans

by

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### ABSTRACT

**Objectives:** Military veterans constitute approximately 30 percent of the adult male population in North Carolina and nationwide, yet little is known about the health of veterans. The objective of this study is to describe selected health conditions and behaviors of discharged male veterans compared to male non-veterans in North Carolina and the United States.

**Methods:** Survey data from the 2000 Behavioral Risk Factor Surveillance System (BRFSS) were used for this study. Veterans were identified as adults who had served on active duty in the United States Armed Forces, either in the regular military or in a National Guard or military reserve unit, but who were no longer in military service. Chronic conditions, risk factors, preventive health services, access to health care, and self-perceived health status were compared between veterans and non-veterans. Age-adjusted rates and odd ratios adjusted for age, race, household income, and education were calculated for each risk category using the SUDAAN software.

**Results:** Age-adjusted rates of arthritis and disability were significantly higher for veterans than for non-veterans in North Carolina. The prevalence of arthritis was also significantly higher for United States veterans than non-veterans, even after adjusting for age, race, education, and household income (adjusted odds ratio = 1.38 for North Carolina and 1.27 for the United States). The odds of being a current or former smoker was significantly higher for both United States and North Carolina veterans compared to non-veterans, after controlling for age, race, education, and household income (adjusted odds ratio for current smoking = 1.40 for North Carolina and 1.55 for the United States). Veterans in both North Carolina and the United States reported more poor mental health days than non-veterans.

**Conclusions:** Veterans were more likely to smoke and reported more poor mental health days than non-veterans. The prevalence of disability was significantly higher among veterans than among non-veterans in North Carolina. An examination of the time of onset of disability revealed that males with a disability almost never enroll in the military, suggesting that military service may be a risk factor for disability. Arthritis prevalence among discharged male veterans was significantly higher for both North Carolina and the United States. The strong association between being a discharged veteran and having arthritis merits further investigation.



NORTH CAROLINA DEPARTMENT OF HEALTH AND HUMAN SERVICES

## Introduction

Military veterans constitute approximately 30 percent of the adult male population in North Carolina and nationwide. However, very little is known about the health behaviors of veterans even though they can be targeted for public health prevention efforts. A few studies have compared cigarette smoking among veterans and non-veterans and have found that the prevalence of ever and current smoking was higher among United States military veterans than non-veterans.<sup>1,2,3</sup>

In order to learn more about veteran health at both the national and state levels, the Veterans Health Administration (VHA) collaborated with the national Behavioral Risk Factor Surveillance System (BRFSS) to include three questions as part of the demographics section on the 2000 survey. These three questions allow us to study health status and health behaviors among veterans and their use of VHA health care facilities, and to compare veterans to other demographic groups. Three studies about veterans using the 2000 BRFSS data were presented at the 2002 national BRFSS conference, adding substantially to the literature in the area of veteran health.<sup>4,5,6</sup> According to these studies, active duty men and veterans who receive care from VHA health care facilities reported higher rates of poor health compared to the general population and compared to the veterans who do not use VHA health care facilities.

The objective of this study is to describe health conditions and health behaviors of discharged male veterans in relation to male non-veterans in North Carolina. We used national BRFSS data to obtain more precise measures of health among veterans and also to compare North Carolina to the United States.

## Methods

Survey data from the 2000 Behavioral Risk Factor Surveillance System (BRFSS) were used for this

study. The BRFSS is a random-digit-dialed telephone survey of non-institutionalized adults ages 18 and older. Nationally, 184,450 interviews were conducted in 50 states, the District of Columbia, and three United States territories; 3,016 of those were conducted by the North Carolina BRFSS in 2000. Veterans were identified as adults who had served on active duty in the United States Armed Forces, either in the regular military or in a National Guard or military reserve unit, but who were no longer in military service. A total of 387 veterans were identified in the North Carolina sample and 23,880 in the United States sample. More than 90 percent of these veterans were males, so we restricted this study to only male veterans. We used non-veteran males as the comparison group.

Chronic conditions, risk factors, preventive health services, access to health care, and self-perceived health status were compared between veterans and non-veterans. The chronic conditions were arthritis, asthma, diabetes, and disability. Persons with these chronic conditions, with the exception of disability, were identified from doctor-diagnosed questions such as, "Have you ever been told by a doctor that you have diabetes?" The North Carolina BRFSS included a disability module in 2000. Adults with disabilities were identified from four disability questions, and the risk behaviors/risk conditions were derived from core survey questions. Access to health care, vaccination, and self-perceived health status questions were among the core questions. Prevalence estimates of all health conditions and behaviors were available from both the national BRFSS and the North Carolina BRFSS, with the exception of disability.

Data were weighted and analyzed using SUDAAN software, designed for the analysis of complex sample designs such as the BRFSS survey. To account for differences in age distributions between veterans and non-veterans, age-adjusted rates were calculated using the 2000 United States standard population.<sup>7</sup> Multiple logistic regression was used to generate adjusted odds ratios for each risk category to measure the association between being a male

discharged veteran and the likelihood of having the chronic disease or risk factor, while controlling for age, race, education, and household income. The rate differences between veterans and non-veterans were tested using a two-tailed t-test.

## Results

Table 1 summarizes race, age, education level and household income distributions of North Carolina and United States veterans and non-veterans. In North Carolina and nationally, approximately 28 percent of adult males reported being a veteran. Demographic characteristics of North Carolina and

the United States veterans were very similar. The percentages in older age groups were higher for veterans compared to non-veterans in both the North Carolina and the United States samples. More than a third of North Carolina and the United States veterans were age 65 and older, compared to approximately 7 percent of North Carolina and United States non-veterans.

Age-adjusted rates for health conditions and behaviors of male veterans and non-veterans are shown in Table 2, along with the odds ratios adjusted for age, race, education, and household income.

**Table 1.** Percentage distribution of demographic characteristics of male veterans and non-veterans in the United States and North Carolina in 2000.

Demographic Groups	North Carolina		United States	
	Veterans (%) N=347	Non-Veterans (%) N=768	Veterans (%) N=22,068	Non-Veterans (%) N=49,865
<b>RACE</b>				
White	82.3	77.9	88.2	80.0
African American	13.6	19.0	8.1	10.0
Other	4.1	3.1	3.7	10.0
<b>AGE GROUP</b>				
18-24	2.2	17.6	1.2	18.0
25-34	8.8	24.0	7.5	24.2
35-44	12.5	24.5	11.3	25.3
45-54	23.2	17.5	21.5	17.3
55-64	20.1	9.3	21.3	8.7
65+	33.3	7.2	37.1	6.6
<b>EDUCATION</b>				
Less Than H.S.	13.9	18.9	8.7	15.3
H.S. or G.E.D.	25.8	32.0	30.9	29.3
Some Post-H.S.	31.3	21.9	30.2	24.5
College Graduate	29.0	27.1	30.1	31.0
<b>HOUSEHOLD INCOME</b>				
Less than \$15,000	7.1	9.5	7.2	9.7
\$15,000- 24,999	15.2	18.0	16.8	17.1
\$25,000- 34,999	17.3	17.5	15.8	14.8
\$35,000- 49,999	23.1	17.1	21.7	18.3
\$50,000+	37.4	38.0	38.6	40.1

**Table 2.** Age-adjusted rates (%) and adjusted odds ratios comparing health conditions and behaviors of male veterans and non-veterans in the United States and North Carolina in 2000.

Health Behavior Indicators	North Carolina			United States		
	Veterans	Non-Veterans	Adj. Odds Ratios <sup>#</sup>	Veterans	Non-Veterans	Adj. Odds Ratios <sup>#</sup>
<b>Chronic Conditions</b>						
Arthritis	24.4*	19.7	1.38*	22.6**	17.7	1.27**
Asthma	6.3	7.2	1.09	8.0*	8.9	0.93
Diabetes	6.5	6.7	0.98	6.9	6.9	1.03
Disability	30.6	24.0	1.44*	—	—	—
<b>Risk Factors/Conditions</b>						
Current Smoker	34.0	27.6	1.40*	31.0**	22.5	1.55**
Former Smoker	33.8*	27.8	1.56**	32.7**	26.3	1.34**
Smokeless Tobacco Use	9.2	9.7	0.70	2.1	2.2	0.71**
Physically Inactive	25.6	29.7	1.07	23.8**	27.4	0.92
Overweight	70.3	65.9	1.38*	67.7**	65.5	1.05*
<b>Preventive Health Behaviors</b>						
No Flu Shot in the Last Year	67.5	70.6	0.85	63.9**	70.1	0.74**
No Pneumonia Vaccination Ever	78.2	79.5	0.85	63.6**	72.9	0.58**
No Routine Checkup in the Last Year	27.6	34.2	0.76	31.1**	36.2	0.79**
<b>Access to Health Care</b>						
No Current Health Insurance	18.4	20.3	1.08	20.8	21.6	0.88*
Could Not See a Doctor Due to Cost	7.3	9.9	0.82	9.4	8.9	0.95
<b>Health Status</b>						
Fair or Poor Health	15.9	18.5	1.00	13.5**	15.8	0.97
Poor Mental Health 14+ days/month	7.0	5.4	1.70*	8.4*	7.3	1.15**
Poor Physical Health 14+ days/month	8.7	9.6	0.94	8.4	8.1	1.08*
Activity Limitation 14+ days/month	6.6	6.3	1.23	5.9	5.4	1.09*

<sup>#</sup>Odds Ratios are adjusted for age, race, education, and household income; non-veterans were the reference group.

\*,\*\*Indicates that age-adjusted rates for veterans are significantly different than for non-veterans at the 0.1 and 0.05 probability levels, respectively, or adjusted odds ratios are significant at the 0.1 and 0.05 probability levels.

Age-adjusted rates of arthritis and disability prevalence were significantly higher for veterans than non-veterans in North Carolina. Similarly, the prevalence of arthritis was significantly higher for United States veterans than non-veterans. Even after adjusting for age, race, education, and household income, veterans had a significantly higher odds of arthritis than non-veterans (Adj. OR=1.38 for North Carolina and 1.27 for the United States). In North Carolina, the veterans also had a significantly higher odds of disability than the non-veterans (Adj. OR=1.44). There were no significant differences in asthma and diabetes prevalence between veterans and non-veterans after adjusting for demographics.

Compared to non-veterans, veterans have equal or higher rates of risk factors and conditions. Higher rates of current and former smoking were evident among veterans. The odds of being a current or former smoker was significantly higher for both United States and North Carolina veterans compared to non-veterans, controlling age, race, education, and household income (Adj. OR for current smoking =1.40 for North Carolina and 1.55 for the United States). North Carolina rates of current and former smoking and particularly smokeless tobacco use were higher than the national rates, for both veterans and non-veterans.

Both North Carolina and United States veterans were somewhat more likely to be overweight. The odds of being overweight was significantly higher for veterans than non-veterans (Adj. OR =1.38 for North Carolina and 1.05 for the United States), after adjusting for demographics. In contrast, the rate of being physically inactive was significantly lower for United States veterans than for the non-veterans. However, this difference was no longer significant after adjusting for age, race, education, and household income.

The rates of not having had a flu shot in the past year, never having had a pneumonia vaccination, or not having a routine checkup in the past year were about the same for North Carolina veterans and non-veterans. However, the corresponding differences in rates between the United States veterans and the non-veterans were highly significant. After controlling for age, race, education, and household income, the odds of not having had a flu shot in the past year, never having had pneumonia vaccination, and not having had a routine checkup in the last year were significantly lower for the United States veterans than for non-veterans. The lack of significant differences in preventive health behaviors for North Carolina is due in part to the smaller BRFSS sample size.

Both veterans and non-veterans had similar access to health care as indicated by no current health insurance and not being able to see a doctor due to cost, for both North Carolina and United States samples. The only exception was that the United States veterans were less likely to have no current health insurance than the United States non-veterans.

Although the United States veterans described their general health as fair or poor less often than the non-veterans, this difference was not significant after adjusting for age, race, education, and household income. In contrast, both North Carolina and United States veterans had significantly higher odds of having 14 or more poor mental health days in a

month than non-veterans, controlling for demographic characteristics. The rates of poor physical health days and activity limitation were similar between the veterans and the non-veterans in North Carolina and the United States, though the odds ratios were marginally significant for the United States (higher odds for veterans).

## Discussion

The prevalence of former and current smoking was high among veterans both in North Carolina and the United States. Given the enormous health care costs associated with smoking, health promotion efforts should be directed at reducing the high rate of smoking among veterans. The smoking-related results from this study are consistent with findings from previous studies. In addition, findings of a higher level of poor mental health days among veterans are consistent with earlier studies.

This study revealed some findings that have not been reported in previous studies about veterans' health risks. We found that the prevalence of disability was significantly higher among veterans than among non-veterans in North Carolina. An examination of the time of onset of disability revealed that males with a disability almost never enroll in the military, and that 93 percent of the veterans with a disability reported that their disability began during adulthood (20 years or older). This suggests that military service may be a risk factor for disability. However, it could also be that persons with certain risk behaviors (e.g., smoking, drinking) are selected into the military and that these risk behaviors in part account for the higher level of disability among veterans.

We found that arthritis prevalence among discharged male veterans was significantly higher for both North Carolina and the United States. A possible explanation for this is that the veterans have a higher prevalence of overweight, which is a risk factor for arthritis. The strong association of being a discharged veteran and having arthritis merits further investigation.

## References

1. Talcott GW, Poston WS, Haddock CK. Co-occurrent use of cigarettes, alcohol, and caffeine in a retired military population. *Military Medicine*. 1998;163(3):133-8.
2. McKinney WP, McIntire DD, Carmody TJ, Joseph A. Comparing the smoking behavior of veterans and nonveterans. *Public Health Reports*. 1997;112(3):212-7; discussion 218.
3. Klevens RM, Giovino GA, Peddicord JP, Nelson DE, Mowery P, Grummer-Strawn L. The association between veteran status and cigarette-smoking behaviors. *American Journal of Preventive Medicine*. 1995;11(4):245-50.
4. Catlin TK, Boothe V, Barrett D. Military service and health related quality of life. 19<sup>th</sup> Annual BRFSS Conference, 2002, Atlanta.
5. Koepsell TD. Using BRFSS data to address non-VA health care use in epidemiologic studies of veterans. 19<sup>th</sup> Annual BRFSS Conference, 2002, Atlanta.
6. Mocer VM, Chapko MK, Reiber GE, Boyko EJ. Self-reported mental health of US veterans. 19<sup>th</sup> Annual BRFSS Conference, 2002, Atlanta.
7. Klein RJ, Schoenborn CA. Age adjustment using the 2000 projected US population. *Healthy People 2010 Statistical Notes*, no. 20. US Department of Health and Human Services, publication no. (PHS) 2001-1237.

**Acknowledgment:** The author would like to thank Paul Buescher, Ph.D., Harry Herrick M.S.W., Tegan Catlin, Ph.D. from Centers for Disease Control Prevention, Nicholas Smith, Ph.D. from Seattle ERIC-University of Washington, and Charles Hunt, M.P.H. for their valuable comments.



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